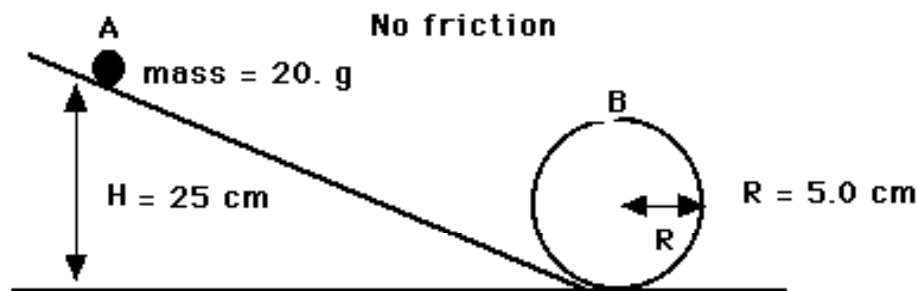


Example #6: A 20. gram steel ball-bearing on a rail rolls from rest at point A, as shown below.



Assuming negligible friction, if $h = 0.25$ m and $R = 0.050$ m,

- what is the speed of the bearing at point B?
- what normal force must the rail exert on the bearing at B?

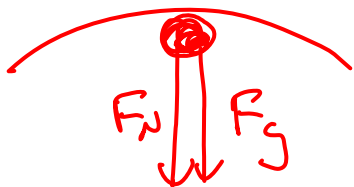
a) Use cons. of energy :

$$\text{at "A", } E_T = E_P = mgh \\ = .02(9.8)(.25) = 0.049 \text{ J}$$

$$\text{at "B", } E_T = E_P + E_K \text{ (2rr)} \\ .049 = .020(9.8)(.10) + \frac{1}{2}(.020)v^2$$

$$v = 1.7 \text{ m/s}$$

b)



$$F_c = F_N + F_g$$

$$F_N = F_c - F_g = \frac{mv^2}{r} - mg$$

$$= .02 \left[\frac{1.7^2}{.05} - 9.8 \right]$$

$$F_N = 0.98 \text{ N}$$